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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,566	10/02/2003	Sourav R. Dey	TI-35332	9296

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EXAMINER	
KANG, SUK JIN	

ART UNIT	PAPER NUMBER
2619	

NOTIFICATION DATE	DELIVERY MODE
11/01/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/677,566	DEY ET AL.	
	Examiner	Art Unit	
	Suk Jin Kang	2619	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. **Claims 1, 2, 4, 6, 9, 11, 14, 16, 19, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chuang et al.** (U.S. Patent Application Publication # 2002/0034267 A1) in view of **Heinonen et al.** (U.S. Patent # 6,389,087 B1).

Consider **claim 1**, Chuang et al. disclose an orthogonal frequency division multiplexing (OFDM) transmitter (figure 1A), comprising: a training sequence generator configured to generate a training sequence ([0026], [0029]); and OFDM transmission circuitry (RF, figure 1A), coupled to said training sequence generator, configured to transmit said training sequence via a channel (figure 1A, [0005], [0026]), but does not expressly disclose a fractional tone in a guard band.

In the same field of endeavor, Heinonen et al. disclose a fractional tone in a guard band (figure 5-7, column 6 lines 32-67, where fractional energy is detected in guard bands and is used to determine error).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate a fractional tone in a guard band as taught by Heinonen et al. with the transmitter as disclosed by Chuang et al. for the purpose of improving channel response estimation.

Consider **claim 6**, Chuang et al. disclose an orthogonal frequency division multiplexing (OFDM) receiver (figure 1A), comprising: OFDM reception circuitry configured to receive (figure 1A), via a channel, a training sequence in a guard band thereof ([0007], [0026]); and a channel estimator (figure 1B, CE), coupled to said OFDM reception circuitry (figure 1A), configured to obtain a channel response estimate ([0026], [0029], [0077]), but does not expressly disclose a fractional tone in a guard band.

In the same field of endeavor, Heinonen et al. disclose a fractional tone in a guard band (figure 5-7, column 6 lines 32-67, where fractional energy is detected in guard bands and is used to determine error).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate a fractional tone in a guard band as taught by Heinonen et al. with the receiver as disclosed by Chuang et al. for the purpose of improving channel response estimation.

Consider **claims 11 and 16**, Chuang et al. disclose a method and system of obtaining a channel response estimate for use with an orthogonal frequency division multiplexing (OFDM) communications system (figure 1A), comprising: an OFDM transmitter (figure 1A) that generates a training sequence and transmits said training sequence via a channel ([0005], [0026], [0029]); and an OFDM receiver (figure 1B) that receives said training sequence and obtains a channel response estimate ([0026], [0029], [0077]), but does not expressly disclose a fractional tone in a guard band.

In the same field of endeavor, Heinonen et al. disclose a fractional tone in a guard band (figure 5-7, column 6 lines 32-67, where fractional energy is detected in guard bands and is used to determine error).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate a fractional tone in a guard band as taught by Heinonen et al. with the method and system as disclosed by Chuang et al. for the purpose of improving channel response estimation.

Consider **claim 2**, and as applied to claim 1, Chuang et al., as modified by Heinonen et al., disclose the claimed invention, furthermore, Heinonen et a. disclose the transmitter wherein said fractional tone is located in a center of said guard band (figure 6-7).

Consider **claims 4 and 19**, and as applied to claims 1 and 16 above, respectively, Chuang et al., as modified by Heinonen et al., disclose the claimed invention, furthermore, Heinonen et al. disclose the transmitter and communications system wherein said fractional tone is positive in sign (figure 5-7, column 6 lines 32-67).

Consider **claims 14 and 20**, and as applied to claims 11 and 16 above, respectively, Chuang et al., as modified by Heinonen et al., disclose the method and communications system wherein said OFDM transmitter generates training sequences in a plurality of guard bands ([0005], [0026], [0029]) and said OFDM receiver obtains said channel response estimate ([0026], [0029], [0077]), furthermore, Heinonen et al. disclose fractional tones in a guard band (figure 5-7, column 6 lines 32-67, where fractional energy is detected in guard bands and is used to determine error).

3. **Claims 3, 5, 7-10, 12, 13, 15, 17, 18, and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Chuang et al.** (U.S. Patent Application Publication # 2002/0034267 A1) in view of **Heinonen et al.** (U.S. Patent # 6,389,087 B1), and further in view of **Li** (U.S. Patent # 6,654,429 B1).

Consider **claims 3, 8, 13, and 18,** and as applied to claims 1, 6, 11, and 16, respectively, Chuang et al., as modified by Heinonen et al., disclose the claimed

invention, furthermore, Heinonen et al. disclose the method, transmitter, receiver, and communications system wherein said fractional tone is attenuated in a training sequence (figure 5-7, column 6 lines 32-67), but does not expressly disclose a decibel level selected from the group consisting of: at about twelve decibels from tones in a data band of said training sequence; and at about six decibels from tones in a data band of said training sequence.

In the same field of endeavor, Li discloses a decibel level selected from the group consisting of: at about twelve decibels from tones in a data band of said training sequence (column 13 lines 11-26); and at about six decibels from tones in a data band of said training sequence (column 13 lines 27-42).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate a selectable group of decibel levels as taught by Li with the method and system as disclosed by Chuang et al., as modified by Heinonen et al., for the purpose of improving channel response estimation.

Consider **claims 5 and 9**, and as applied to claims 1 and 6 above, respectively, Chuang et al., as modified by Heinonen et al., disclose the claimed invention wherein Heinonen et al. disclose the transmitter and receiver wherein said guard band is free of excited tones other than said fractional tone (figure 5-7, column 6 lines 32-67).

Furthermore, Li discloses wherein said channel estimator linearly interpolates remaining tones of said guard band (column 4 lines 26-34, column 5 lines 14-22, column 6 lines 51-62).

Consider **claim 7**, and as applied to claim 6, Chuang et al., as modified by Heinonen et al., disclose the claimed invention wherein Heinonen et al. disclose the receiver wherein said fractional tone is located in a center of said guard band (figure 6-7).

Furthermore, Li discloses wherein said channel estimator interpolates remaining tones of said guard band (column 4 lines 26-34, column 5 lines 14-22, column 6 lines 51-62).

Consider **claims 10, 15 and 21**, and as applied to claims 6, 11, and 16 above, respectively, Chuang et al., as modified by Heinonen et al., disclose the claimed invention, furthermore, Li discloses the method, receiver, and communications system wherein said channel estimator is further configured to interpolate a DC tone based on adjacent tones of said training sequence (column 4 lines 26-34, column 5 lines 14-22, column 6 lines 51-62).

Consider **claims 12 and 17**, and as applied to claims 11 and 16 above, respectively, Chuang et al., as modified by Heinonen et al., disclose the claimed invention wherein Heinonen et al. disclose the method and communications system wherein said fractional tone is located in a center of said guard band (figure 6-7).

Furthermore, Li discloses wherein said OFDM receiver interpolates remaining tones of said guard band (column 4 lines 26-34, column 5 lines 14-22, column 6 lines 51-62).

Response to Arguments

4. Applicant's arguments filed September 6, 2007 have been fully considered but they are not persuasive.

Consider claims 1, 2, 4, 6, 9, 11, 14, 16, 19, and 20, Applicant argues, on page 7 of the remarks, that "They [Chuang or Heinonen] do not teach placing any tone actually within either of their guard bands in their transmitter..."

The Examiner respectfully disagrees with Applicant's argument because as recited in the above rejection, Heinonen does suggest a fractional tone (excited tones, 504, figure 6 and 506, figure 7) in a guard band (212, 214, figure 5-7) (column 6 lines 51-55 and 61-65). Applicant fails to explicitly define a fractional tone in the claims, therefore, the claimed fraction tone in a guard band reads on the excited tones in a guard band as suggested by Heinonen.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to**:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

7. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Suk Jin Kang whose telephone number is (571) 270-1771. The examiner can normally be reached on Monday - Friday 8:00-5:00 EST.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Chau Nguyen can be reached on (571) 272-3126. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you

have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

Suk Jin Kang
S.J.K./sjk

October 22, 2007

CHAU NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600